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# Evaluating Universal Design in Built Environments - A Scoping Project

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Abstract. This project aimed to scope existing methods of evaluating the application of universal design to built environments and to explore relevant knowledge of key stakeholders, such as architects, access consultants and people who experience disability. The project commenced in 2017. Ethics approval was gained and a mixed methods approach was employed. Methods of data collection included electronic survey and in-depth interview. Early survey findings are reported in this paper. A descriptive approach was used to analyse quantitative data. A total of 157 survey responses were received from across Australia (83%) and internationally (16.6%). Preliminary findings indicate that most survey respondents (72%) had been involved in the process of applying universal design to the design of built environments. Although evaluating the application of universal design was rated as "extremely important" by 85% of respondents, only 36% had such experience. Of these, 74% had used specific tools for this purpose. Non-standardised checklists and access audits were the most frequently used and preferred tools. Overall, stakeholders perceived themselves to have 'some knowledge' on universal design theory and application. This project offers insight into how universal design is understood and applied to the design of built environments. Findings suggest that evaluation is less common than application and that there is a need to strengthen existing methods of evaluation to provide greater detail on universal design processes and outcomes.

Keywords. Universal Design, Built Environment, Evaluation, Application, Knowledge

#### 1. Introduction

To reduce discrimination and enhance social participation, Universal Design is increasingly being endorsed by policy relating to the design of built environments both in Australia and overseas. Despite an increasing demand for Universal Design in built environments, there continues to be a lack of clarity on what evidence of application, if any, is required by policy makers and other stakeholders. At present, there is no clear definition of what constitutes a universally designed built environment or how the quality of Universal Design application can be measured. The aim of this project was to gather information on how the application of Universal Design to built environments is

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currently being evaluated, and what stakeholders perceive as appropriate methods of evaluation.

## 2. Method

## 2.1. Study Context

In 2017, a project was conducted to scope existing methods of applying and evaluating Universal Design in the built environment in Australia and, to a lesser extent internationally. This was intended to provide greater insight into how Universal Design is understood, applied and evaluated in practice. The project used a mixed-methods approach to data collection and analysis. An extensive 10-year literature review of Universal Design evaluation case studies and tools was conducted and aligned to the Goals of Universal Design [1]. as intended or achieved Universal Design outcomes in the built environment. Ethics approval was gained from Deakin University Faculty of Health Ethics Committee, Australia (HEAG-H 99\_2017). Methods of data collection included electronic survey and in-depth interview. This paper presents early findings gathered from the survey.

## 2.2. Data Collection

A mixed-methods, online survey was used to gather data on stakeholders' knowledge and experience of Universal Design application and evaluation in the built environment. The survey comprised 35 questions presented in six sections: Demographic Information; Knowledge of Universal Design; Experience in the Application of Universal Design; Evaluation of Universal Design in the Built Environment; Recommendations for Evaluation of Universal Design in the Built Environment; and Next Stage of Research. Demographic information gathered included age, gender, occupation, country of residence, type of organisation worked in, and experience of disability. Survey questions utilized multiple choice selections, Likert scale items, and open-ended format. Examples included:

- "On a scale of 1-10, with 1 being 'Not important' and 10 being 'Extremely important,' how would you rate the importance of evaluating the application of Universal Design to the built environment?"
- "Please describe what you believe Universal Design means in the context of public buildings and space."

The survey was developed using the Qualtrics<sup>©</sup> platform, and disseminated online via a hyperlink through professional websites, email and social media posts to: professional practitioners whose current role involves advocacy, implementation and / or evaluation of Universal Design in built environments; peak industry bodies; policy makers whose role involves the advocacy, implementation and / or evaluation of Universal Design in built environments; expert users, such as Disabled People's Organisations; and expert academics. A plain language statement outlining the study was presented at the beginning of the survey, with informed consent sought prior to survey commencement and confirmed prior to submission of responses. The survey was available for four weeks, and participants were also invited to participate in a follow-up

qualitative interview at its conclusion. All contact details were removed from survey findings prior to analysis in order to maintain anonymity.

To be eligible for inclusion, participants required one or more recent (<last 5 years) roles in: environmental design, planning or policy; advocacy; and implementation or evaluation of Universal Design of built environments.

### 2.3. Data Analysis

A descriptive approach was used to analyse quantitative data, through the use of means and frequencies. Thematic analysis is currently underway to analyse qualitative data, whereby data is coded and then consolidated into themes to represent the views of multiple participants. These findings will be reported in future publications.

### 2.4. Participants

The survey was completed by 157 participants. The majority (n=130; 82.8%) were working in Australia, while 26 (16.6%) were working overseas, and one (0.6%) did not state location.

Participants were generally older, with 64 participants (40.8%) indicating that they were over 55 years of age. Gender distribution was relatively even. As presented in Figure 1, participants identified most frequently as an Academic / Researcher (n=38; 24.2%), Access Consultant (n=27; 17.2%), Architect (n=22; 14%), Disability Advocate (n=20; 12.7%) and Occupational Therapist (n = 18; 11.5%). Many participants (n=49; 31.2%) selected 'Other' as their occupational role, including 'Planning and Infrastructure Coordinator', 'Traffic Engineer', and 'Administration'.

Note that some survey questions allowed for multiple responses and percentages total greater than 100 percent.



Figure 1. Occupation of survey participants.

Over half of survey participants (n=101; 64.3%) indicated that they had lived experience of disability either personally or from the experience of a family member or close friend. An additional 29 (18.5%) participants had secondary experience of

disability, such as working as a service provider with people who experience disability, teaching about the needs of people who experience disability, or working alongside people who experience disability in advocacy roles.

## 3. Findings

Self-perceived knowledge of the Principles of Universal Design [2], the Goals of Universal Design [1] and the application of Universal Design was assessed on a ten-point scale (1 = No knowledge, 10 = Comprehensive knowledge). Participants rated their knowledge of the Goals of Universal Design slightly lower than their knowledge of the Principles of Universal Design, although both means were in the mid-range of the scale. Participants rated their knowledge of Universal Design application more strongly (Table 1).

 Table 1. Participants' self-rated knowledge of Universal Design

	Design	Design	Universal Design
Mean	6.03	5.55	6.36
SD	2.9	2.95	2.66

Most participants (n=113; 72%) had experience in applying Universal Design to the built environment and were asked to indicate which building type(s) Universal Design had been applied to, what stakeholder(s) had been involved and at what stage(s) of the design process Universal Design had been applied. The most frequently identified building types to which Universal Design had been applied were Universities (n=66; 58%), Healthcare Facilities (n=55; 48.6%) and Community Buildings, such as libraries or museums (n=50; 44.2%) (Figure 2).



Figure 2. Types of buildings to which Universal Design had been applied.

Stakeholders most frequently identified as being involved in the Universal Design application process were Architects (n=87; 77%) and Access Consultants (n=60; 53.1%). Of the 112 participants who responded to the question regarding the stage of design, Universal Design was most commonly applied during the Preliminary Design stage (n=94; 84%).

Just over a third of participants (n=57; 36.3%) had been involved in evaluating Universal Design in the built environment. These participants were asked what stakeholders had been involved in Universal Design evaluation, and at what stage(s) of the design process did evaluation occur. Access Consultants (n=25; 43.9%) were most commonly identified as being involved in the evaluation process, followed by Architects (n=20; 35.1%), Academics / Researchers (n=18; 31.6%) and Disability Advocates (n=17; 29.8%).

The evaluation of Universal Design was reported to most frequently occur at the Post-Building Occupation stage (n=32; 56.1%), or during Preliminary Design (n=29; 50.9%). Most respondents (n=42; 74%) had used specific tools or methods in their evaluation of Universal Design (Figure 3), with checklists (n=33; 57.9%) being most commonly identified, along with Access Audits (n=31; 54.4%). Many respondents selected Other (n=29) and presented varied descriptions of evaluation methods, including housing design guidelines, legislative standards or specific tools, such as the Innovative Solutions for Universal Design (isUD) [3] or the Universal Mobility Index (UMI) [4].



Figure 3. Universal Design evaluation tools used by survey participants.

Participants were also asked about their opinions on what should happen in relation to evaluating Universal Design in the built environment. When asked to rate the importance of evaluation on a scale of 1 to 10 (1 = Not important, 10=Extremely important), the majority of respondents (n = 134; 85.4%) rated the importance of evaluation as being eight or above ( $\bar{X} = 8.90$ ; SD = 1.40). Participants overwhelmingly indicated they believed evaluation should occur 'during the design phase' (n=149; 95%) but there was also significant support for its evaluation 'once the building has been occupied' (n=86; 54.8%), 'after the design phase is completed' (n=78; 49.7%), 'during the construction phase' (n=76; 48.4%) and 'once the building is built' (n=74; 47.1%). When asked who should evaluate Universal Design, participants strongly supported the engagement of Access Consultants (n=112; 71.3%), Architects (n=92; 58.6%) and Disability Advocates (n=80; 51%).

#### 4. Discussion

In this study, there was a clear disparity between the proportion of participants who had applied Universal Design to built environments and those who had participated in its evaluation. This discrepancy suggests that, in many cases, the Universal Design process is being applied to built environments, but the process of its implementation and / or outcomes is not being measured or reported upon. This finding reflects the review of literature in which no existing studies were found that reported an evaluation specifically of the principles or goals of Universal Design as applied to the built environment. Moreover, participatory, user-expert models of Universal Design evaluation found in the literature predominantly evaluate Universal Design in the existing built environment rather than interrogate the process of designing and constructing Universal Design into the built environment [5]. O'Shea, Pavia, Dyer, Craddock, and Murphy's [5] overview of Universal Design in the built environment.

When asked about method(s) of evaluation, the majority of respondents in this study indicated that checklists and access audits were most frequently used and preferred. The inclusion of people with lived experience of disability was evident in some current evaluation practices and viewed as highly important by participants. However, the frequent use of checklists and access audits may not elicit the depth of information available from this group of building users. As Meshur [6] notes, subjective evaluation tools with lower specificity than objective checklists may contribute greater insight from people who experience disability. Focusing on physical access to the environment, Green and Jackson's [7] UMI provides one example of a subjective tool that could measure the success of Universal Design application using a five-point scale from 'very bad' to 'very good'. The tool measures the lived experience of physical access across all parts of the built environment and participants include people with a range of mobility issues including, age-related limitations, vision impairment and wheelchair use [7]. In a case study reviewed by Grimble, Danford and Schoell [8], the authors refer to an "Environmental Utility Measure" and "Functional Performance Measure" [p.1] that can be used to rate participants' perceptions and performance in the built environment, including people with and without impairments. Usability is proposed to be achieved when the effort expended to perform an activity is rated as "remarkably low" [p.1]. More broadly, to gather sufficient information on the application of Universal Design to built environments, multiple methods of assessment and tools are likely to be required [5, 9, 10]. Multiple methodologies might include observation, interviews, and shadowing the daily activities of building users [11].

There were also discrepancies between who is currently involved in the evaluation of applied Universal Design, and who participants believe should be involved. Access Consultants, Architects, Academics / Researchers and Disability Advocates were most commonly identified as currently being involved in the evaluation of Universal Design, but participants in this study indicated that they also wanted engagement from other stakeholders, such as Occupational Therapists and Building Surveyors. In addition, Academics / Researchers were the third most commonly involved group of stakeholders in current practice but were ranked as the tenth group of stakeholders who survey respondents perceived should be involved in evaluation. In relation to the timing of evaluation, the findings from this study indicate that current practice of evaluating during Preliminary Design and Post Occupancy stages reflects the opinions of participants regarding what should occur. A high number of participants also supported evaluation at other stages, indicating the preference of evaluation to occur across multiple stages of the design process.

While most participants had recent experience in applying Universal Design to built environments, their self-perceived knowledge on the theory and application of Universal Design was not high. A greater understanding of how key stakeholders understand Universal Design in relation to built environments is warranted, in order to understand what users are applying and evaluating as Universal Design. As noted by O'Shea, et al. [5], the diverse meanings ascribed to the concept of Universal Design contribute to the difficulty of evaluating its application to the built environment.

## 5. Conclusion

This project offers insight into how Universal Design is understood and applied to built environments, largely, but not exclusively, in an Australian context. Findings suggest that evaluation is less common than application, and that there is a need to better understand the meaning of Universal Design to key stakeholders and to strengthen existing methods of evaluation in order to provide greater detail on and enable broader participation in Universal Design processes and outcomes.

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